At present there are conflicting opinions about how the most efficacious serum can be produced and also how it should be given. Some authors feel that it is essential to give the antilymphocyte serum before grafting ; others think that it is more effective if it is given shortly afterwards. There is a similar debate about how long treatment with antilymphocyte serum must be continued after the grafting operation in order to maintain the immunosuppressive effect. There is also marked species difference, and the most potent serum so far produced is that of the rabbit against the mouse. It is not yet known which species will produce the best sera for therapeutic use in man. There is a great deal of work to be done before we will know the full potentialities of antilymphocyte serum in the fields of both transplantation and autoimmune disease. In particular it is likely that attempts will be made to produce purified active fractions of the serum, since these seem less likely to give rise to dangerous allergic side-effects.

Transfer of Tumour Cells by Mosquitoes

Until a few years ago the suggestion that mosquitoes might transmit cancer would have been treated with scepticism. But now there is a suspicion that certain species may transmit the virus or viruses thought to cause Burkitt's lymphoma.[1 2] Moreover, W. G. Banfield and his colleagues[2 3] have shown that mosquitoes can also transmit a lymphoma in experimental animals. The mechanisms are of considerable interest, particularly as they appear to be radically different from those believed to operate in the Burkitt tumour.

These experimental studies were carried out on a reticulum cell sarcoma which originally occurred as a single, apparently spontaneous, neoplasm in an old hamster.[4] This tumour is readily transplanted by conventional techniques, grows rapidly at the site of transplantation, and metastasizes widely, with a late leukaemic phase. Mosquitoes (*Aëdes aegypti*) allowed to feed on animals during the leukaemic stage proved capable of transferring the lymphoma to normal hamsters.[2 3]

Two techniques were employed to demonstrate this. In the first, mosquitoes in the post-prandial state were placed subcutaneously in normal animals and then crushed ; in the second, the mosquitoes were allowed to bite the recipient animals. Although the incidence of positive "takes" was much lower by the latter method (10% as opposed to 88%), both groups showed one remarkable feature—the tumour was still transmissible for up to eight hours after the mosquito had fed. In all instances in which the tumour was successfully transferred the clinical course of the disease was indistinguishable from that observed in the original donor animals.

These are intriguing observations, but many features are still obscure. The role of the mosquito is probably purely passive and the actual species may be irrelevant. Nevertheless, it seems desirable to check this point by comparing the performance of a number of different species. Next, there is the apparent resistance of reticulum cell sarcoma cells to mechanical and chemical damage during their sojourn in the mosquito. Their distribution is uncertain, but they are clearly not confined to the mouth parts and proximal portions of the foregut. Some lymphoma cells may accumulate in the dorsal and ventral diverticula, but Banfield and his colleagues described large numbers of tumour cells in the midgut,[3] the main site of secretion of digestive enzymes.[5] Unless the tumour cells are unusually resistant to these enzymes many must surely be destroyed. This implies that successful "takes" can be achieved by the transference of relatively few viable tumour cells, but more information on this point, using standard quantitative transplantation methods, is clearly needed. On the other hand, there are grounds for supposing that the tumour cells are indeed unusually robust, in so far as the tumour has apparently been successfully transmitted between hamsters by simple feeding.[4] Confirmation of this remarkable finding would seem to be desirable, preferably combined with some in-vitro studies on the cells, in an attempt to clarify the nature of their extraordinary resistance.

The exact sequence of events which takes place when mosquitoes bite the hamsters is obscure. It is not clear, for example, whether tumour cells are transferred in the saliva or whether viable cells are also regurgitated from lower down the gut, particularly from the foregut diverticula. Finally, there is the problem of what exactly is transmitted—tumour cells only, a virus only, or tumour cells plus virus ? No tumours have been induced with a wide range of cell-free filtrates,[4] and the authors emphasize the unusually consistent karyotype shown by the tumour[6] ; seven extra chromosomes are regularly present, including a distinctive marker chromosome. This is in contrast to the more unstable karyotype patterns seen in cells transformed by viruses such as SV 40[7] and polyoma.[8] These facts support the view that transference was by cells in the present experiments, but they do not exclude the possibility that the reticulum cell tumour was *originally* induced by a virus.

Though much remains to be clarified, it appears that in certain circumstances the mosquito may transmit enough viable tumour cells to healthy recipients to induce tumours in them. But undoubtedly the lymphoma used by Banfield and his colleagues is highly unusual and the relevance of their findings to the transmission of the Burkitt tumour and other human cancers cannot yet be assessed. Further information will be awaited with interest.

Improving Medical Communication

In recent years the American National Library of Medicine, at Bethesda in Maryland, has contributed greatly to the development and improvement of communication in the biomedical sciences. Foremost among these developments has been the introduction, in 1963, of the Medical Literature Analysis and Retrieval System (MEDLARS).[1]

This computerized system for the retrieval of information has two main purposes. Firstly, it makes the production of the *Index Medicus* easier, and, secondly, it provides a speedy

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